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Review

A REVIEW OF THE DEVELOPMENT OF INTERNATIONAL SCIENCE COOPERATION IN THE ARCTIC WITH A FOCUS ON IASC ACTIVITIES AND ITS SCIENCE PRIORITY PROJECTS

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Abstract: In the brief review of the development of international science cooperation in the Arctic, a survey of the main historical events in the development of circumarctic science cooperation was given. It was pointed out that this development was closely linked to the geopolitical situation, as was the founding of the International Arctic Science Committee (IASC).

A further survey of the IASC, its organisation, and with an emphasis on the science planning process and the science priority projects under development within IASC was given. This planning would then reach a milestone at the International Conference for Arctic Research Planning, organised by IASC, and held 5–9 December 1995 at Dartmouth College, Hanover, USA. This was a science planning conference bringing together both leading arctic scientists, science managers, and representatives from funding agencies and users.

A Short Historical Background

International scientific cooperation in the Arctic has a long and interesting history. The expedition led by Constantine John Phipps in **1775** is traditionally regarded as the first international effort of this kind.

Renewed interest for international cooperation in the Arctic occurred during the last quarter of the 19th century. The Austrian Karl **Weyprecht** strongly advocated that the earlier nationally competitive geographical explorations should be replaced by international scientific research carried out according to a plan. Such thoughts led to the creation of the **International Polar Commission** in **1879**, and then to the **International Polar Year, 1882–83**.

The International Polar Year was the first coordinated international series of observations involving twelve sponsoring nations with observatories in 25 countries. The **Second International Polar Year, 1932–33** marked another coordinated study of high-latitude phenomena. Forty-four nations took part, and the network of stations was considerably extended.

In 1950 ICSU (the International Council of Scientific Union) approved a resolution that a **Third International Polar Year** be organised for 1957–58. However, the name was later changed to the **International Geophysical Year (IGY)** as systematic observations over the whole surface of the earth were required. The programme was, however, to give special attention to the polar regions, and it initiated a major effort in Antarctic research. ICSU also discussed a proposal for a **Special Committee for Arctic and Antarctic Re-**

search (SCAAR) at its 1957 meeting. However, for both political and practical reasons, it was decided in 1959 to proceed with the Special Committee on Antarctic Research (SCAR).

The political east-west division as a consequence of the Cold War, divided the Arctic into two parts, and international scientific cooperation was mostly developed within these blocks. There were exceptions to this, as some global organisations under ISCU and UN had an arctic component in their global programme.

Changes in East-West relations starting around 1985 made a dialogue about the creation of a circumarctic science organisation possible. The series of meetings leading to the founding of IASC started in 1986 and ended in 1990. Since then we have also seen other circumarctic cooperation being established, not least governmental cooperation, and currently the process of forming an Arctic Council is ongoing and likely to become a reality within months.

There are several lessons that can be learnt from this brief historical account, possibly the most important one is that international circumarctic research is dependant on a positive political climate between the Arctic states.

What is IASC?

IASC—the International Arctic Science Committee—is a non-governmental organisation formed to encourage and facilitate cooperation in all aspects of arctic research, in all countries engaged in arctic research and in all areas of the arctic region.

Members of IASC are national science organisations covering all arctic sciences (usually a national academy of sciences or a similar science organisation have a national committee for polar research).

At present 15 countries are members: Canada, Denmark, Finland, France, Germany, Iceland, Japan, Norway, The Netherlands, Poland, Russia, Sweden, Switzerland, the United Kingdom and the USA.

The mission of IASC is to initiate, coordinate and promote basic and applied interdisciplinary research concerned with the Arctic at a circumarctic or international level, and to provide scientific advice on arctic issues.

Organisation

The IASC is composed of:

- The Council — which is the policy and decision making body with one member from each country
- The Regional Board — is mainly concerned with regional science problems, and sees to it that IASC activities are consistent with regional interests. One member from each of the eight arctic countries
- Working Groups — are the main fora for scientific activities
- An Arctic Science Conference — will be convened periodically to identify key scientific questions and issues, and
- The Secretariat

Standing Advisory Groups—Liaisons

As a broad, circumarctic and interdisciplinary science organisation IASC has initiated a dialogue with other organisation to ensure a close cooperation and avoid duplication. This process has not come to an end, but at present we have the following relationships:

(1) Standing Advisory Groups, *i.e.* circumarctic science organisations covering one or several sciences and advising IASC on cooperation efforts etc.

These organisations are:

- IASSA - The International Arctic Social Sciences Association,
- IUCN - The International Union for Circumpolar Health.

(2) Liaisons

Liaisons mean exchange of information, observers at meetings and discussions on cooperation if a need arises.

These organisations are:

- IPA - The International Permafrost Association,
- SCAR - Scientific Committee on Antarctic Research,
- UNESCO MAB/NSN (Northern Science Network).

(3) Other relationships

IASC is the only circumarctic science organisation invited as a standing observer to **AEPS** (the Arctic Environmental Protection Strategy—a governmental cooperation) and its sub-programmes such as AMAP (Arctic Monitoring and Assessment Programme) CAFF (Conservation of Arctic Flora and Fauna), TFSD (Task Force on Sustainable Development) etc.

The relation to the coming **Arctic Council** is not yet defined, but IASC could be a suitable adviser to them on arctic science issues

Science Initiatives

As mentioned, **working groups** are the main fora for scientific discussions. At present there are working groups for: Global Change, Marine Geology, Geophysical Compilation and Mapping, Glaciology and ISIRA (The International Science Initiative in the Russian Arctic).

Before a working group is appointed, an ad-hoc group has been engaged to work out a science plan and some terms of reference.

At present there are several such ad-hoc groups concerned with issues such as an "International Arctic Environmental Data Directory", "Effect of UV-Radiation", "Terrestrial Ecology", "Arctic Marine/Coastal/Riverine Systems", and three project areas under the heading of Sustainable Development: "Dynamics of Arctic Populations and Ecosystems", " Sustainable Use of Living Resources of High Value to Arctic Residents", and "Environmental and Social Impacts of Industrialisation in the Arctic".

Priority projects

As the activities have grown, it was agreed to select a few programmes to be given priority and achieving research output from these programmes within an agreed period of time. (In addition to these priority projects, a number of other projects are ongoing).

Priority was given to **interdisciplinary** projects relevant to arctic science issues which require international cooperation.
More precisely, this is achieved by:

- **thematic** rather than disciplinary issues,
- bringing together **physical, biological and social sciences** to address substantive issues,
- strengthening the **dialogue between science community and policy community**,
- **addressing concerns of those who live in and near the Arctic**,
- basing science initiatives on **priorities of the arctic science community in each member country**, in the context of international programmes.

There are about **10 priority projects**. They are in various stages of planning, but the intention is to reach the implementation plan stage at ICARP—the International Conference for Arctic Research Planning in December 1995.

The present priority projects are grouped in four categories:

I. Impacts of Global Change in the Arctic Region and its People

1.1. Effects of Increased UV-Radiation

The first indications of increased UV-radiation in the Arctic have already been reported. This project addresses what effects such an increase will have on humans, terrestrial and marine ecosystems, and also on northern societies and settlements.

1.2. Regional Cumulative Impacts

Regional impact assessments, particularly of cumulative impacts, are a high priority on the international global change research agenda. They represent a synthesis and analysis of the ongoing global change research in a region.

There are two such impact studies in planning:

- BASIS - The Barents Sea Impact Study, and
- BESIS - The Bering Sea Impact Study.

Both studies to cover the seas mentioned and all adjacent land and islands.

II. Arctic Processes of Relevance to Global Systems

2.1. Mass Balance of Glaciers and Ice Sheets

The mass balance of glaciers and ice sheets, particularly of Greenland (and Antarctica) is not well known, yet may have very substantial effects on sea level, ocean stability and stratification, on sea ice production in the Arctic Ocean and bottom water formation in the marginal seas.

2.2. Terrestrial Ecosystems and Feedbacks on Climate Change

This project includes the effects of changes in climate, CO_2, UV-B, nutrients, and water on the tundra ecosystem, as well as feedback effects on climate due to changes in the albedo, water and energy balance, and trace gas release and uptake.

III. Natural Processes within the Arctic

These projects focus on the Russian Arctic, and developing cooperation with the Russian arctic science communities is a goal in addition to science.

3.1. Arctic Marine/Coastal/Riverine Systems

The focus will be on the land-ocean interactions, especially in the coastal zone. There are some bilateral projects which may constitute parts of an internationally agreed programme. Initial discussion at a workshop in the Autumn.

3.2. Disturbance and Recovery of Arctic Terrestrial Ecosystems

Some terrestrial ecosystems are badly affected by human and industrial activity. How can science contribute to a recovery process?
Cooperative efforts in this area are the topic of a workshop to be held in September this year. The best 1–3 projects will be further developed at ICARP.

IV. Sustainable Development in the Arctic

4.1. Dynamics of Arctic Populations and Ecosystems

Arctic systems are often regarded as fragile and sensitive to anthropengenic and other disturbances. Drawing on recent developments in the study of population and ecosystem dynamics, this project will re-examine this assumption as well as our understanding of arctic systems more generally, with particular reference to biodiversity, fragility, productivity and regeneration.

4.2. Sustainable Use of Living Resources of High Value to Arctic Residents

Focusing on species of importance to arctic residents, this project will examine harvesting practises, management regimes, and, more generally, the factors that account for variations in the outcomes flowing from human/environment interactions.

4.3. Environmental and Social Impacts of Industrialisation in the Arctic

The Arctic is also the scene of large-scale extractive industries (*i.e.* hydrocarbon development, mining, industrial fishing). It is also affected by airborne and waterborne pollutants originating far to the South *e.g.* arctic haze, persistent organochlorines).
This project will employ the techniques of environmental and social impact assessment to explain and predict the consequences of these developments on both the natural and social systems.

The planning process

Some of these projects have been discussed in working groups or similar fora for a while, whereas others were only project ideas a year ago.
For most of them, there is a planning process with a **core group** of active scientists drafting science and implementation plans; and a **network** of interested scientists reviewing the drafts.

The outcome of this process will be presented and further discussed at:

The International Conference for Arctic Research Planning

Up to 250 scientists, funding representatives and science managers will take part in this **planning** conference to be held 5–9 December 1995 at Dartmouth College, Hanover, USA.

The main goal is to reach agreement on **implementation plans** for the IASC priority projects.

In addition to active, leading scientists, funding representatives and some policy people will also be present to advise on realistic implementation.

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